Agriculture Mechanics and Maintenance

Agricultural Mechanics includes standards to prepare students for operational procedures for a shop or a home environment. Students learn basic skills in areas ranging from welding and electricity to land measuring to plumbing. As students enter the 21st century, they need to have skills that can be used in a rural or an urban environment.

Pre-requisites: **None**

Recommended Credit: **½ or 1**

Recommended Grade Levels: **10th, 11th**

***** **½ denotes learning expectations that must be met when teaching the course for ½ credit.**

****** **All learning expectations must be met when teaching the course for 1 credit.**

Agriculture Mechanics and Maintenance

Standard 1.0

The student will demonstrate basic shop procedures for agricultural mechanics and maintenance.

Standard 2.0

The student will design a layout and provide measurements for an agricultural project.

Standard 3.0

The student will construct or repair a metal agricultural project or agricultural machinery.

Standard 4.0

The student will construct and repair agricultural structures.

Standard 5.0

The student will examine the operation of a small engine and its applications.

Standard 6.0

The student will demonstrate the integration of academic competencies in Agricultural Mechanics and Maintenance.

Standard 7.0

The student will develop premier leadership and personal growth needed for success and advancement in the career area of agricultural mechanics.

Course Description

Agricultural Mechanics includes standards to prepare students for operational procedures for a shop or a home environment. Students learn basic skills in areas ranging from welding and electricity to land measuring to plumbing.

Standard 1.0

The student will demonstrate basic shop procedures for agricultural mechanics and maintenance.

Learning Expectations:

The student will:

1.1	Assess the value of teamwork in a laboratory environment.	½
1.2	Evaluate the need for a code of ethics for working in the laboratory.	½
1.3	Specify safety procedures to use when working on farm machinery or power equipment.	½
1.4	Examine proper sharpening techniques for tools.	½

Evidence Standard is Met:

The student will:

- Recommend procedures to follow when working on a project with team members.
- Develop a code of ethics to be followed in the laboratory environment.
- Recommend safety precautions to follow when working on farm machinery and power equipment.
- Demonstrate proper sharpening techniques for tools.

Integration Linkages

Language Arts, Computer Skills, SCANS (Secretary's Commission on Achieving Necessary Skills), OSHA Standards, TOSHA Standards

Sample Performance Tasks

- Prepare laboratory rotation charts to schedule teams for various projects.
- Prepare a contract agreeing to a determined code of ethics for the course.
- Prescribe step by step procedures for working with agricultural machinery and equipment.
- Recondition tools used in the laboratory.

Standard 2.0

The student will design a layout and provide measurements for an agricultural project.

Learning Expectations:

The student will:

2.1	Illustrate the principles of design layout.	½
2.2	Manipulate construction measurements used in agriculture.	½
2.3	Use precision instruments in constructing agricultural projects.	
2.4	Use surveying equipment for profile and differential leveling.	

Evidence Standard is Met:

The student will:

- Design an agricultural mechanics project.
- Prepare to scale drawings of agricultural projects.
- Compute a profile or differential-leveling problem using a farm level or transit.

Integration Linkage

Mathematics, Geometry, Algebra, Art, Drafting, SCANS (Secretary's Commission on Achieving Necessary Skills), TOSHA Standards, OSHA Standards

Sample Performance Tasks

- Select, design and construct an agricultural mechanics project.
- Use precision measuring instruments in creating or repairing a project.
- Design an environmental agricultural project using surveying equipment.

Standard 3.0

The student will construct or repair a metal agricultural project or agricultural machinery.

Learning Expectations:

The student will:

3.1	Evaluate the proper use of cold metal working tools.	½
3.2	Use arc-welding equipment.	½
3.3	Use shielded gas-welding equipment.	
3.4	Use oxyacetylene equipment.	½

Evidence Standard is Met:

The student will:

- Demonstrate procedures for using and conditioning hand tools.
- Demonstrate steps to use in arc welding.
- Demonstrate steps for using shielded gas welding equipment.
- Demonstrate the use of oxyacetylene equipment.

Integration Linkages

Geometry, Chemistry, Mathematics, Metallurgy, Art, Drafting, SCANS (Secretary's Commission on Achieving Necessary Skills), TOSHA Standards, OSHA Standards

Sample Performance Tasks

- Prepare a metal project from cold metal working tools.
- Construct a metal project using an arc welder.
- Construct a project using a shielded gas welder.
- Construct a project with oxyacetylene equipment.

Standard 4.0

The student will construct and repair agricultural structures.

Learning Expectations:

The student will:

4.1	Recommend building materials for a specific project.	½
4.2	Illustrate basic unit conversions.	½
4.3	Estimate a bill of materials and calculate its costs.	½
4.4	Design building walls using framing materials.	
4.5	Determine the equipment needed to install an electrical circuit.	
4.6	Determine the appropriate materials needed to mix concrete and mortar.	½
4.7	Design an agricultural structure using concrete blocks or bricks.	
4.8	Measure, cut and join plumbing materials.	½
4.9	Determine materials needed for rafters and trusses.	

Evidence Standard is Met:

The student will:

- Install electrical circuits for a home electrical system.
- Design a load and a no-load wall.
- Specify building material costs, using a bill of materials.
- Mix concrete and mortar.
- Prepare materials for laying a corner out of block or brick materials.
- Install a plumbing structure that can be used in a home plumbing system.
- Prepare a set of rafters or a truss for use in a roof.

Integration Linkages

Mathematics, Science, Language Arts, National FFA Agricultural Mechanics CDE Guidelines, TOSHA Standards, OSHA Standards, SCANS (Secretary's Commission on Achieving Necessary Skills), National Electrical Codes

Sample Performance Tasks

- Construct an electrical system, using receptacles and switches.
- Frame an eight-foot-by- eight-foot wall from two-foot-by-four-foot studs.

- Select materials and tools needed in construction.
- Figure a bill of materials for agricultural projects.
- Complete a plumbing job on a closed system.
- Cut a set of rafters or truss from standard building materials.
- Pour concrete steps for use as a walkway.
- Lay a corner of blocks three tiers high.

Standard 5.0

The student will examine the operation of a small engine and its applications.

Learning Expectations:

The student will:

5.1	Diagram the parts of small air-cooled engines.	½
5.2	Clean and service small air-cooled engines.	½
5.3	Compare the basic operations of two- and four-cycle engines.	½
5.4	Differentiate the parts and purposes of small engine systems.	

Evidence Standard is Met:

The student will:

- Determine the functions of the main parts of the small engine.
- Maintain a small air-cooled engine using standard servicing and operating procedures.
- Troubleshoot problems with the engine and systems.

Integration Linkages

Mathematics, Physics, Physical Science, Language Arts, TOSHA Standards, OSHA Standards, SCANS (Secretary's Commission on Achieving Necessary Goals)

Sample Performance Tasks

- Adjust a carburetor.
- Test for spark plug replacement.
- Test all systems for proper operation.
- Develop a maintenance schedule for a small engine.

Standard 6.0

The student will demonstrate the integration of academic competencies in Agricultural Mechanics and Maintenance.

Language Arts:

The student will:

6.1	Complete appropriate shop and technical forms.	½

Mathematics:

The student will:

6.2	Convert English/metric ratios.	½
6.3	Read instruments in metric or English.	½
6.4	Use ratios and percentages in basic shop skills.	

Science:

The student will:

6.5	Explain physical properties involved in combustion.	½
6.6	Explain basic hydraulic principles using Pascal's laws.	
6.7	Explain basic laws of electricity.	

Evidence Standard is Met:

The student will:

- Calculate measurements for agricultural machinery and structures.
- Prepare communications describing facility and machinery needs.

- Summarize relationships between principles in science and agricultural machinery and facilities.

Integration/Linkages
Language Arts, Mathematics, Physics, Electronics, SCANS (Secretary's Commission on Achieving Necessary Skills)

Sample Performance Tasks
- Determine the amount of materials needed for a specific project.
- Evaluate the need for mechanical repairs and maintenance.
- Demonstrate how the laws of physics affect an internal combustion engine.

Standard 7.0

The student will develop premier leadership and personal growth needed for success and advancement in the career area of agricultural mechanics.

Learning Expectations:
The student will:

7.1 Analyze careers in agricultural mechanics. ½
7.2 Use a program of FFA activities to develop leadership skills. ½
7.3 Develop a supervised agricultural experience program based on an agricultural mechanics career area. ½
7.4 Demonstrate mechanical proficiency through FFA career development events.
7.5 Prepare exhibits for displays.
7.6 Demonstrate abilities of parliamentary procedure.
7.7 Develop a group presentation on agricultural mechanics.

Evidence Standard is Met:
The student will:
- Recommend careers in agricultural mechanics, based on skills needed.
- Prepare a resume for a career in agricultural mechanics.
- Complete records needed for a successful SAEP, supervised agricultural experience program.
- Prepare for participation in the agricultural mechanics CDE, career development event.
- Complete a lab activity, using parliamentary procedure.
- Prepare a speech, oral report or demonstration, on an agricultural mechanics procedure.

Integration Linkages
Computer Applications, Language Arts, Public Speaking, National FFA Guidelines for Agricultural Mechanics CDE, SCANS (Secretary's Commission on Achieving Necessary Skills), National FFA Guidelines for Proficiency Awards, National FFA Guidelines for Degrees and Awards, National FFA Guidelines for Community Education Programs

Sample Performance Tasks
- Submit a resume for an agricultural career and obtain feedback from the employer on its strengths and weaknesses.
- Complete appropriate forms for a proficiency award.
- Complete appropriate forms for degree advancement in the FFA.
- Participate in FFA Agricultural Mechanics CDE.
- Design an agricultural mechanics display for a fair, conference or show.
- Complete an application for employment.
- Participate in the FFA Partners for a Safer Community.
- Participate in the FFA Farm Safety Just 4 Kids.
- Participate in the America Reads Challenge.